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EXAMINER	
SHARON, AYAL I	

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 11/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/064,191	PAPPONE, DANIEL	
	Examiner	Art Unit	
	Ayal I. Sharon	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 June 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 June 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/3/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Claims 1-15 of U.S. Application 10/064,191, originally filed on 06/20/2002, have been presented for examination.

Claim Objections

2. Claims 4, 5, 9, 10, 14, and 15 are objected to because of the following informalities: "predetermined amount of conservative" should be "predetermined amount of conservatism", or other grammatically-correct expression. Appropriate correction is required.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. **Claims 1-15 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.** An invention which is eligible for patenting under 35 U.S.C. § 101 is in the "useful arts" when it is a machine, manufacture, process or composition of matter, which produces a concrete, tangible, and useful result. The fundamental test for patent eligibility is thus to determine whether the claimed invention produces a "**useful, concrete and**

tangible result." The test for practical application as applied by the examiner involves the determination of the following factors:

a. "**Useful**" - The Supreme Court in *Diamond v. Diehr* requires that the examiner look at the claimed invention as a whole and compare any asserted utility with the claimed invention to determine whether the asserted utility is accomplished. Applying utility case law the examiner will note that:

   - the utility need not be expressly recited in the claims, rather it may be inferred.
   - if the utility is not asserted in the written description, then it must be well established.

b. "**Tangible**" - Applying *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), the examiner will determine whether there is simply a mathematical construct claimed, such as a disembodied data structure and method of making it. If so, the claim involves no more than a manipulation of an abstract idea and therefore, is nonstatutory under 35 U.S.C. § 101. In *Warmerdam* the abstract idea of a data structure became capable of producing a useful result when it was fixed in a tangible medium which enabled its functionality to be realized. See especially MPEP §2106 (A). See especially also *Schrader*, 22 F.3d at 295, 30 USPQ2d at 1459.

c. "**Concrete**" - Another consideration is whether the invention produces a "concrete" result. Usually, this question arises when a result cannot be assured.

5. The Examiner respectfully submits that the final claimed steps of the invention, "analyzing an event by a [deterministic or probabilistic] methodology", do not recite *either a tangible or a concrete result*.

   a. The claims are not tangible because "analyzing an event" is an abstract idea.

   b. The claims are not concrete because there is no identifiable output. Since there are no results, results are not assured.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

8. Independent claims 1, 6, and 11 all claim "analyzing an event by a [deterministic or probabilistic] methodology", but the claims do identify what the final result of

this "analysis" is. One of ordinary skill in the art at the time the invention was made would not have been able to make and/or use the claimed invention without undue experimentation as to the outcome of the claimed "analysis", because there is a large variety of parameters and functions that one could "analyze". All dependent claims inherit this defect.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Independent claims 1, 6, and 11 all claim "analyzing an event by a [deterministic or probabilistic] methodology", but the claims do identify what the final result of this "analysis" is. The dependent claims inherit this defect.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. The prior art used for these rejections is as follows:

14. King, T. et al. "Framework for Risk-Informed Changes to the Technical Requirements of 10 CFR 50." Draft, Revision 2. August, 2000. Cited by Applicant in the IDS filed 09/03/2002. (Hereinafter "**Framework**").

15. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.

16. Claims 1-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Framework.

17. In regards to Claim 1, Framework teaches the following limitations:

1. A risk-informed method for safety analyses of nuclear power generating systems, said method comprising:

ordering events by an initiating event frequency;

defining an initiating event frequency threshold value;

Examiner notes that Fig.3-1 lists three categories of event initiating frequencies: (1) frequent initiators, (2) infrequent initiators, and (3) rare initiators.

defining acceptance criteria having an adjusted amount of conservatism, wherein the amount of conservatism is a function of the initiating event frequency; and

The Framework reference teaches the use of a "safety margin" (see especially p.4-1):

> The treatment of uncertainty from the design basis perspective involves the notion of safety margin. Colloquially, terms like safety margin and safety factor imply a measure of the conservatism employed in a design or process to assure a high degree of confidence that it will work to perform a needed function.

And also see especially p.4-2, right column:

> Safety margin is imposed to account for uncertainties in data and models by conservatisms placed in acceptance criteria and methods for demonstrating compliance with acceptance criteria. The approach preferred for the Option 3 study is (1) to specify reasonable safety margin in acceptance criteria based on probabilistic considerations and risk

> insights, and (2) to use best-estimate code calculations with uncertainty propagation to demonstrate compliance based on a computed 95th percentile. When this approach is precluded, an attempt will 'be made to achieve an equivalent level of safety margin in order to avoid excessive conservatism.

analyzing an event by a deterministic safety analysis methodology when the event has an event initiating frequency at or above the threshold value; or

analyzing an event by a probabilistic risk assessment methodology when the event has an event initiating frequency below the threshold value.

The Framework reference teaches (see especially p.2-2, right column) that:

> The structuralist or traditionalist model asserts that defense-in-depth is embodied in the structure of the regulations and in the design of the facilities built to comply with those regulations. ...
>
> In contrast, the rationalist (or risk-based) model asserts that defense-in-depth is the aggregate of provisions made to compensate for uncertainty and incompleteness in our knowledge of accident initiation and progression. This is made practical by the ability to quantify risk and estimate uncertainty using PRA [probabilistic risk assessment] methods.

The Framework reference further teaches (see especially p.2-3, left column, first para.) that:

> The approach adopted herein recognizes the relevance of both structuralist and risk-based considerations.

The Framework reference further teaches (see especially p.2-3, right column) that:

> Quantitative guidelines are developed in Chapter 3 to characterize a reasonable balance among the preventive and mitigative strategies.

The Framework reference further teaches (see especially p.3-1, right column) that:

> As a starting point for developing quantitative guidelines, consider the Quantitative Health Objectives (QHOs), which were originally set to as a measure of "safe enough" ...

The Framework reference further teaches (see especially p.3-2) that:

> Conceivably, both QHOs could be met by reducing a plant's CDF [core damage frequency] to 10^{-5}/yr or less with no containment and no preplanned offsite protection options. This would not constitute a risk-informed approach.
>
> What is required for a risk-informed approach are quantitative measures and guidelines that can be used to describe and indicate the effectiveness of the defense-in-depth strategies. The measures and guidelines proposed for this purpose are summarized in Figure 3-1. They are generally consistent with those in current use (e.g., (Ref. 11)(Ref. 12)).

18. In regards to Claim 2, Framework teaches the following limitations:

2. A method in accordance with Claim 1 further comprising determining an amount of conservatism used in the deterministic safety analysis methodology, wherein the amount of conservatism is a function of the initiating event frequency.

The Framework reference teaches the use of a "safety margin" (see especially p.4-1):

> The treatment of uncertainty from the design basis perspective involves the notion of safety margin. Colloquially, terms like safety margin and safety factor imply a measure of the conservatism employed in a design or process to assure a high degree of confidence that it will work to perform a needed function.

And also see especially p.4-2, right column:

> Safety margin is imposed to account for uncertainties in data and models by conservatisms placed in acceptance criteria and methods for demonstrating compliance with acceptance criteria. The approach preferred for the Option 3 study is (1) to specify reasonable safety margin in acceptance criteria based on probabilistic considerations and risk insights, and (2) to use best-estimate code calculations with uncertainty propagation to demonstrate compliance based on a computed 95^{th} percentile. When this approach is precluded, an attempt will 'be made to achieve an equivalent level of safety margin in order to avoid excessive conservatism.

19. In regards to Claim 3, Framework teaches the following limitations:

3. A method in accordance with Claim 2 further comprising:

identifying additional system failures that are not a direct consequence of the initiating event;

defining a total threshold frequency for the combination of the initiating event frequency and the additional failure frequency; and

adding additional system failures to the safety analysis, one at a time, until a total frequency of an event plus additional failures is less than the total threshold frequency when the initiating event frequency is above the total threshold frequency.

See especially p.3-5, left column:

> The quantitative guideline is less than 10^{-2}/ry for the frequency of all initiators in the infrequent category. On an industry-wide basis it is possible to monitor performance against this quantitative guideline. The quantitative guideline for the conditional probability of core damage given an infrequent initiator is 10^{-2} to ensure a CDF less than 10^{-4}. Based on existing PRAs the proposed quantitative guidelines provide a reasonable balance between initiator prevention and core damage prevention. The guidelines for the two mitigative strategies are again a conditional probability of a large early release of 10^{-1} or less and a conditional probability of a large late release of 10^{-1} or less.
>
> For accidents in which one or more of the four high-level defense-in-depth strategies is precluded, the individual strategy guidelines may be less important than their products; that is, more emphasis needs to be placed on the strategies that remain. For example, consider a PWR interfacing-system loss-of-coolant accident (ISLOCA) in which containment is bypassed. The early containment failure probability is 1.0, therefore the quantitative guideline of 10^{-1} cannot be achieved. Since no special ECCS is provided for ISLOCAS, there is a need to limit the relative frequency of such LOCAS and consider them in emergency planning.

20. In regards to Claim 4, Framework teaches the following limitations:

4. A method in accordance with Claim 2 wherein determining an amount of conservatism used in the deterministic safety analysis methodology comprises developing at least one deterministic safety analysis methodology containing a predetermined amount of conservative based on the initiating event frequency,

wherein the predetermined amount of conservatism used in a deterministic safety analysis methodology is a function of the difference between the initiating event frequency and the initiating event frequency threshold value.

See the rejection of claim 2. Examiner finds this to be inherent to the definition of a "safety margin" or "margin of error".

21. In regards to Claim 5, Framework teaches the following limitations:

5. A method in accordance with Claim 1 wherein defining acceptance criteria having an adjusted amount of conservatism comprises developing at least one acceptance criteria containing a predetermined amount of conservative based on the initiating event frequency,

wherein the predetermined amount of conservatism for an acceptance criteria is a function of the difference between the initiating event frequency and the initiating event frequency threshold value.

See the rejection of claim 2. Examiner finds this to be inherent to the definition of a "safety margin" or "margin of error".

22. **Claims 6-10 and 11-15 are rejected based on the same reasoning as claims 1-5. Claims 6-10 are system claims, and claims 11-15 are computer program claims that recite limitations equivalent to those recited in method claims 1-5 and taught throughout Framework.**

Conclusion

23. The following prior art, made of record and not relied upon, is considered pertinent to applicant's disclosure. The following reference all pertain to either statistical analysis, safety analysis, or control of boiling water reactors (BWR).

24. U.S. Patent 6,785,636 to Darken et al.

25. U.S. Patent 6,799,124 to Perdue et al.

26. U.S. Patent 6,772,128 to Radigan et al.

27. U.S. Patent 5,970,437 to Gorman et al.

28. U.S. Patent 4,632,802 to Herbst et al.

29. U.S. PG-PUB 2002/0031200 to Metell.

30. Official Transcript of Proceedings, U.S. Nuclear Regulatory Commission, April 12, 2002. http://www.nrc.gov/reading-rm/doc-collections/acrs/tr/fullcommittee/2002/ac020412.html

31. Miller, D.W. et. al. "Dynamic Safety Systems in BWR Plant Safety Systems." IEEE Transactions on Nuclear Science. Aug. 1995, Vol.42, Issue 4, pp.975-981.

32. Turso, J.A. et al. "Kalman Filter-Based Maximum *A Posteriori* Probability Detection of Boiling Water Reactor Stability". IEEE Transactions on Control Systems Stability. Sept. 2004. Vol.12, Issue 5, pp.750-756.

33. Youngborg, L.H. "Retrofits to BWR Safety and Non-Safety Systems Using Digital Technology." IEEE Nuclear Science Symposium and Med. Imaging Conf. Oct 31, 1992. Vol.2, pp.724-726.

34. Ross, M.A. et al. "Control Room Design and Automation in the Advanced BWR." IEEE Nuclear Science Symposium. Oct. 22-27, 1990. pp.954-960.

35. Taggart Rogers, S. et al. "Automated Production and Maintenance of BWR Emergency Operation Procedures." IEEE 5th Conf. on Human Factors and Power Plants. June 11, 1992. pp.160-166.

36. Andersen, V.M. et al. "Human Error Probability Models in the BWR Individual Plant Evaluation Model." IEEE 4th Conf. on Human Factors and Power Plants. June 9, 1988. pp.323-342.

37. Kakehi, A. et al. "Microprocessor-Based Fault-Tolerant Reactor Control and Information System." IEEE Transactions on Energy Conversion. March 1990, Vol. 5, Issue 1, pp.52-57.

38. Hucik, S.A. "Advanced Boiling Water Reactor, The Next Generation: Status and Future." IEEE Nuclear Science Symposium and Medical Imaging Conf. Nov. 9, 1991. Vol.2, pp.1377-1382.

39. Fukazaki, T. et al. "Knowledge-Based System for Core Operation Management of Boiling Water Reactors." Proc. of the Int'l Workshop on Artificial Intelligence for Industrial Applications. May 27, 1998. pp.143-148.

40. Kobayashi, Y. et al. "Optimization of Boiling Water Reactor Loading Pattern Using an Improved Genetic Algorithm." Proc. of the 2001 IEEE Int'l Symposium on Intelligent Control. Sept. 2001, pp.383-390.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a bi-week, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached at (571) 272-3749.

Any response to this office action should be faxed to (571) 273-8300, or mailed to:

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (571) 272-2100.

Ayal I. Sharon

Art Unit 2123

November 9, 2005

Paul L. Rodriguez 11/10/05

Primary Examiner
Art Unit 2125